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MINIMUM VOCATIONAL COMPTENCIES BASED CURRICULUM
INLAND FISHERIES

Vocationalization of education Unit
National Council of Educational Research and Training
Sri Aurobindo Marg, New Delhi - 110 016

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NAME OF THE VOCATION - INLAND FISHERIES

1. JOB OPPORTUNITIES

WAGE EMPLOYMENT

1.1 Field Assistant/Field Technician.
1.2 Laboratory Assistant.
1.3 Supervisor.
1.4 Seed production Assistant/Fish breeder/Hatchery Operator.
1.5 Feed Technician.
1.6 Marketing Assistant.
1.7 Gear Technician.
1.8 Extension Assistant.
1.9 Survey Assistant.
1.10 Management Assistant (Fishery Estate).

SELF EMPLOYMENT

1.11 Running a fish farm for culture.
1.12 Ornamental fish production.
1.13 Spawn production.
1.14 Pituitary banks.
1.15 Feed manufacture.
1.16 Fish marketing.
1.17 Net making/Gear operator.
1.18 Seed collection and bunds breeding.

2. JOB DESCRIPTION

WAGE EMPLOYMENT

2.1 Field Assistant/Field Technician.

2.1.1 Collection of samples - a) soil b) benthos c) water and d) plankton.
2.1.2 Eradication of weeds and harmful water insects.

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2.1.3 Application of fertilizers and manures.

2.1.4 Identification of common fishes, aquatic insects, weeds and plankton.

2.1.5 Application of supplementary feed mixtures.

2.1.6 Extraction and preservation of pituitary gland.

2.1.7 Identification of fish seed of carps.

2.1.8 Selection of brooders.

2.1.9 Hatchery operation and maintenance.

2.1.10 Seed packing and transport.

2.1.11 Fabrication and operation of all nets.

2.2 LABORATORY ASSISTANT

2.2.1 Maintenance and upkeep of laboratory equipment.

2.2.2 Sampling and processing of test material.

2.2.3 Preparation of necessary reagents and their storage.

2.2.4 Simple analysis of test material and observation.

2.2.5 Preservation of biological specimen.

2.3 SUPERVISOR

2.3.1 Performing all duties of field assistant.

2.3.2 Identification of common fish diseases and their control.

2.3.3 Working out of doses for application of manures, fertilizers, feed and pituitary hormons.

2.3.4 Recording and maintenance of field data and records.

2.3.5 Nursery and pond management.

2.3.6 Maintenance of gears and tackle.

2.3.7 Assisting in pre and post-impoundment survey.

2.3.8 Determination of quality and quantity of stocking material.

2.3.9 Tagging operation.

2.3.10 Maintenance of catch composition data.

2.3.11 Fish handling and storage.

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2.4 SEED PRODUCTION ASSISTANT/FISH BREEDER/HATCHERY OPERATION

2.4.1 Collection and maintenance of brood stock.
2.4.2 Sexing of the brooders.
2.4.3 Determination of maturity stages.
2.4.4 Operation of basic equipment in fish breeding.
2.4.5 Preparation and administration of hormones.
2.4.6 Assessment of fertilization in hatching systems.
2.4.7 Hatchery operation and maintenance.
2.4.8 Nursery and pond management.
2.4.9 Identification of common fish diseases and their control.
2.4.10 Maintenance of gear and tackle.
2.4.11 Packing and transport of fish seed.

2.5 FEED TECHNICIAN

2.5.1 Identification of feed ingredients.
2.5.2 Assessment of feed requirement.
2.5.3 Procurement of feed.
2.5.4 Maintenance and upkeep of stores.
2.5.5 Sampling of feed ingredients.
2.5.6 Compounding of feed.
2.5.7 Feeding operation.
2.5.8 Maintenance of records and accounts.

2.6 MARKETING ASSISTANT

2.6.1 Marketing survey.
2.6.2 Procurement of stock (seed and table fish).
2.6.3 Procurement of ancillary items.
2.6.4 Fish handling and storage.
2.6.5 Packing and transport.
2.6.6 Maintenance of records and accounts.
2.6.7 Organising the fish sale shops.

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2.7 GEAR TECHNICIAN

2.7.1 Surveying and requirement of gear and tackle.

2.7.2 Procuring raw material for nets and tackle.

2.7.3 Net making and mending.

2.7.4 Demonstration and use of different gears and tackle (different type of crafts).

2.7.5 Preservation of nets and tackle.

2.8 EXTENSION ASSISTANT

2.8.1 Maintenance of liason with fisheries department, research, education, industry, fisherman and fish farmer.

2.8.2 Organising transfer of technology through different media.

2.8.3 Feed back problems and constraints.

2.8.4 Evaluation of transfer of technologies as applicable to local areas.

2.9 SURVEY ASSISTANT

2.9.1 Assisting in survey of fresh water fishery resources in the area.

2.9.2 Assisting in conducting socio-economic survey of fisherman population.

2.9.3 Assisting in market surveys.

2.9.4 Assisting in compilation and analysis of data.

2.10 MANAGEMENT ASSISTANT (FISHERY ESTATE)

2.10.1 Assisting in establishment of Fishery estates.

2.10.2 Assisting in preparation of feasibility reports of fishery estates.

2.10.3 Assisting in the preparation of detail reports.

2.10.4 Arrangement of infrastructure.

2.10.5 Procurement of stocking material.

2.10.6 Assistance in executing the programme.

2.10.7 Maintenance of records and accounts.

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SELF EMPLOYMENT

1.11 RUNNING A FISH FARM FOR CULTURE

1.11.1 Seeking guidance.
1.11.2 Selection of site/pond, arranging of site on long lease.
1.11.3 Preparation of the project.
1.11.4 Arranging the institutional finance.
1.11.5 Creating the infrastructure.
1.11.6 Performing all duties of the Field Assistant.
1.11.7 Harvesting and marketing.
1.11.8 Maintenance of records and accounts.

1.12 ORNAMENTAL FISH PRODUCTION

1.12.1 Seeking consultancy.
1.12.2 Preparation of the project.
1.12.3 Arranging the institutional finance.
1.12.4 Creating the infrastructure.
1.12.5 Maintenance and breeding.
1.12.6 Marketing and sales promotion.
1.12.7 Maintenance of records and accounts.

1.13 SPAWN PRODUCTION

1.13.1 Seeking guidance.
1.13.2 Selection of site/pond, arranging of site on long lease.
1.13.3 Preparation of the project.
1.13.4 Arranging the institutional finance.
1.13.5 Creating the infrastructure.
1.13.6 Performing all duties of the Field Assistant.
1.13.7 Harvesting and marketing.
1.13.8 Maintenance of records and accounts.

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1.14 PITUITARY BANKS

1.14.1 Seeking guidance.
1.14.2 Survey of potential sources for pituitary gland.
1.14.3 Preparation of the project.
1.14.4 Arranging the institutional finance.
1.14.5 Procurement of pituitary gland, its preservation and sale of glands.
1.14.6 Maintenance of records and accounts.

1.15 FEED MANUFACTURE

1.15.1 Seeking guidance.
1.15.2 Survey of market.
1.15.3 Preparation of the project.
1.15.4 Arranging the institutional finance.
1.15.5 Creating the infrastructure.
1.15.6 Preparation of feed.
1.15.7 Marketing and sales promotion.
1.15.8 Maintenance of records and accounts.

1.16 FISH MARKETING

1.16.1 Seeking guidance.
1.16.2 Survey of market.
1.16.3 Preparation of the project.
1.16.4 Arranging the institutional finance.
1.16.5 Creating the infrastructure for storage.
1.16.6 Procurement of stock and its preservation.
1.16.7 Marketing.
1.16.8 Maintenance of records and accounts.

1.17 NET MAKING/GEAR OPERATOR

1.17.1 Seeking guidance.
1.17.2 Survey of market.
1.17.3 Preparation of the project.

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1.17.4 Arranging the institutional finance.
1.17.5 Procurement of raw materials.
1.17.6 Marketing and sales promotion.
1.17.7 Maintenance of records and accounts.

1.18 SEED COLLECTION AND BUNDS BREEDING

1.18.1 Seek consultancy.
1.18.2 Survey of potential resources.
1.18.3 Preparation of the project.
1.18.4 Arranging institutional finance.
1.18.5 Creating the infrastructure.
1.18.6 Collection of spawn from rivers and bundhs.
1.18.7 Marketing of seed.
1.18.8 Maintenance of records and accounts.

Sl.No.	Task	Knowledge	Skills	Personality traits
1	2	3	4	5
	WAGE EMPLOYMENT			
3.1	FIELD ASSISTANT/FIELD TECHNICIAN.			
3.1.1	Collection of samples a) soil b) benthos	- Types of soil physical properties of soil - Types of benthos - Types of benthos Samplers & sieves.	- Soil sampling, pH determination by strips. Permeability test. Phosphate and nitrogen determination by soil testing kits. - Identification of common groups of benthos. Use of dredge. Preservation and lebelling of material.	Cleanliness Systematic Accuracy Sincerily Swimming.
	c) Water	- Quality of water.	Collection of water samples and analysis for pH, DO, CO_2, and total alkalinity.	
	d) Plankton	- Common groups of zoo and phto plankton - Plankton collection equipments.	Methods of plankton collection and preservation. Quantitative estimation of plankton. Identification of common plankton.	

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1	2	3	4	5
3.1.2	Eradication of Weeds and harmful water insects.	Types of weeds. Methods of eradication, manual, mechnical, chemical and biological. Common harmful aquatic insects. Methods of eradication.	Identification of weeds. Manual & mechanical deweeding. Handling of deweeding equipment. Preparation of chemical for spraying. Identification of harmful aquatic insects. Eradication of insects by netting & oil emulsion.	Carefulness. Ability to recognise. Observation.
3.1.3	Application of fertilizers and manures.	Types and composition of manures and fertilizers. Methods of application of manures and fertilizers. Determination of doses.	Identification of manures and fertilizers and estimation of doses. Phase manuring . Preparation and application.	Accuracy Sicnerily Observation.
3.1.4	Identification of common fishes, aquatic insects, weeds and plankton.	Common culturable, predatory weed fishes including prawns and crabs and harmful aquatic insects, common weeds and planktons.	Identification of common fishes, prawns & crabs. Identification of harmful aquatic insects, weeds and planktons.	Ability. Sincerity
3.1.5	Application of Supplementary feed mixtures.	Compounding of feed, methods of application. Computation of doses.	Identification of feed ingredients. Preparation of feed mixtures. Application of feeds.	Accuracy Observation Sincerity Hard work

1	2	3	4	5
3.1.6	Extraction and preservation of pituitary gland.	Characteristics of donor. Location of pituitary gland. Functions of pituitary gland, Methods of removal and preservation of pituitary gland.	Removal of pituitary gland, weighing and preservation. Maintaining record.	Carefulness Accuracy Systematic.
3.1.7	Identification of fish seed of carps.	Terminology used for different stages (egg to fingerling) Identification, characterstic of eggs, spawn, fry and fig fingerling of desirable carps.	Identification of fry and fingerling of carps.	Observation.

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1	2	3	4	5
3.1.8	Selection of brooders	Characteristics of brooder	Identification of male and female	Observation
		Maturity stages	Determination of maturity stages	
3.1.9	Hatchery operation and maintenance	Types of hatcheries	Installation of	Carefulness
		Components of hatcheries	Operation of hatchery	Cleanliness
		Installation of hatchery	Management of hatchery water	Patience
		Quality of water	Spawn handling, Seed packing and transport	Observation
		Water management		
		Operation of hatchery	Visit to hatchery sites.	
		Determination of fertilization percentage		
3.1.10	Seed packing and transport	Principles of conditioning of seed	Conditioning of seed	Carefulness
		Types of packing material.	Packing of seed under oxygen	Alertness
		Principles of fish seed packing	Cleaning of water for packing the seed	Observation
		Seed carriers and transport.		

1	2	3	4	5
3.1.11	Febrication and operation of all nets	Types of nets and traps and their use Principles of preparation and framing different types of nets Principles of use of floats and sinkers	Weaving of webbing Framing of nets and traps Operation of nets	Skillfulness
3.2	LABORATORY ASSISTANT			
3.2.1	Maintenance and upkeep of laboratory equipment	Handling of laboratory equipment - Microscopes, pH meter, water sampless, dredge, plankton net etc.	Handling of equipment	Carefulness
3.2.2	Sampling and processing of test material	-	Processing of soil, benthos, water and plankton samples	Carefulness
3.2.3	Preparation of necessary reagents and their storage	-	Preparation of all reagents	Accuracy Carefulness
3.2.4	Simple analysis of test materials and observation	-	Determination of soil texture, pH, dissolved oxygen, free carbon dioxide and total alkalinity. Handling of soil testing kit.	Accuracy Carefulness

1	2	3	4	5
3.2.5	Preservation of biological specimen	Types of preservatives Principles of preservation	Preservation of biological specimen	Skillfulness Carefulness
3.3	SUPERVISOR			
3.3.1	Performing all duties of Field Assistant.	Refer to 3.1	Refer to 3.1	Refer to 3.1
3.3.2	Identification of common fish diseases and their control	Ecto and endo-parasites Common viral, bacterial, fungal and protozoan diseases. Symptoms and control	Identification of common parasites Identification of viral, bacterial, fungal and protozoan diseases. Control methods.	Carefulness Observation
3.3.3	Working out of doses for application of manures fertilizers, feed and pituitary hormone.	Different types of manures fertilizers and feeds. Methods of application of manures, fertilizers and feeds. Use of hormones in breeding of fish.	Manuring a [illegible] r-tilizing t [illegible] nds Preparation o feed and its application in po[illegible]	Carefulness Skillfulness
3.3.4	Recording and maintenance of field data and maintenance of records	Accountancy and book keeping Maintenance of registers	Recording of data	Systematic

1	2	3	4	5
3.3.5	Nursery and pond management	Principles and concept of pond management	Preparation of pond Stocking Feeding Growth studies Harvesting	Hardwork Dedication Carefulness Sincerity Observation
3.3.6	Maintenance of gears	Principles of net mending	Mending of nets	Skillfulness
3.3.7	Assisting in pre and post impoundment survey	Flora and fauna durin pre and post impoundment Breeding sites of fishes in the river and their effects on impoundments	Collection and identification of fauna and flora	Ability to distinguish
3.3.8	Determination of quality and quantity of stocking material.	Species and size composition Stocking ratio	Identification of fingerlings of carps Stocking of fingerlings	Efficiency Carefulness
3.3.9	Tagging operation	Principles of tagging operation for population growth and migration. Tyoes of tags and tagging operation	Tagging methodology	Systematic

1	2	3	4	5
3.3.10	Maintenance of catch composition data	-	Recording catch composition and length-weight data by random sampling.	Systematic Observation Comprehension
3.3.11	Fish handling and storage	Principles and techniques of handling and preservation. Types of packing material and storage	Packing and preservation	Hardwork Carefulness Hygiene Sanitation

1	2	3	4	5
3.4	SEED PRODUCTION ASSISTANT/ FISH BREEDER/HATCHERY OPERATOR			
3.4.1	Collection and maintenance of brood fish	Methods of collection, selection and handling of brood fish Preparation of brood ponds Stocking and feeding Health and growth	Collection, selection and transport of brooders Preparation of brood ponds Regular feeding for health, growth and maturity.	Hard work Observation Sincerity Carefulness
3.4.2	Sexing of the brooders	Segregation on the basis of male and female characters and size. Period of segregation and Preparation of segregation pond and their maintenance	Physical segregation of sexes. Transportation, Plan & Meintenance	Sincerity Carefulness
3.4.3	Determination of maturity stages	Studies of gonad (male and female) from 1st to VIIth stages Sex dimorphism	Handling and sample dissection of fish brooder for maturity Examination of external characters.	Carefulness Skillfulness Sincerity
3.4.4	Operation of basic equipment in fish breeding	Need and requirement of induced breeding equipment and their maintenance.	Handling and operation of equipment.	Carefulness Skillfulness

1	2	3	4	5
3.4.5	Preparation and administration of hormones	Dose estimation, preparation and administration	Preparation of Pituitary extract and administration	Carefulness Skilfulness
3.4.6	Adsessment of fertilization in hatching systems.	-	Distinguishing between fertilized and unfertilized eggs.	Accuracy
3.4.7	Hatchery operations and maintenance	Refer to 3.1.9	Refer to 3.1.9	Refer to 3.1.9
3.4.8	Nursery and pond management	Refer to 3.3.5	Refer to 3.3.5	Refer to 3.3.5
3.4.9	Identification of common fish diseases and their control.	Refer to 3.3.2	Refer to 3.3.2	Refer to 3.3.2
3.4.10	Maintenance of gear & tackle.	Refer to 3.3.2	Refer to 3.3.2	Refer to 3.3.2
3.4.11	Packing and transport of fish seed	Dfferent types and methods packing for long and short distances	Handling and packing of seed	Carefulness

1	2	3	4	5
3.5	FEED TECHNICIAN			
3.5.1	Identification of feed ingredients.	Principles of formation of artificial feed.	-	-
3.5.2	Assessment of feed requirement.	Feeding requirement at spawn, fry, fingerlings and adult stage under different conditions.	-	-
3.5.3	Procurement of feed	Seasonal availability of feed Price structure Purchase procedure		
3.5.4	Maintenance and upkeep of stores.	Methods and maintenance of storage.	-	-
3.5.5	Sampling of feed ingredients	Methods of sampling	Sampling of feed	Accuracy
3.5.6	Compounding of feeds	Terminology used in feeds Objectives of compounding Methods of compounding Machinery used in compounding and peletizing Binding agents Advantages and disadvantages of pelettization.	Compounding of feed	Comprehension

1	2	3	4	5
3.5.7	Feeding operation	Methods of feeding	Feeding by various methods	Carefulness Sincerity
3.5.8	Maintenance of records and accounts.	Types of records and registers.	Filling of records and preparation of stock balance	Comprehension

1	2	3	4	5
3.6	MARKETING ASSISTANT			
3.6.1	Marketing survey	Methodology for survey of wholesale and retail fish market-demand-supply	Preparation of tools like, proformae, schedules, statements Tabulation and presentation of data. Analysis and interpretation of data - Report writting	Comprehension Hardwork
3.6.2	Procurement of stock (seed and table fish)	Type of materials required, seasons, price structure and sources	Market visits, negotiations and actual purchase Verification of quality and quantity	Comprehension
3.6.3	Procurement of ancillary items	Study of market, price structure for ice, etc.	Procurement of ice, pattal, baskets, salt etc.	Salesmanship Good conduct
3.6.4	Fish handling and storage	Refer to 3.3.11	Refer to 3.3.11	Refer to3.3.1
3.6.5	Packing and transport	Different types and methods of packing for long end short distance	Handling fish, ice and packing material for transport	Hard work Sincerity

1	2	3	4	5
3.6.6	Maintenance of records and accounts	Refer to 3.5.8	Refer to 3.5.8	Refer to 3.5.8
3.6.7	Organising the fish sale shops	Selection of site Pricing system Pricing product Product popularity Methods of popularization.	Procuring, running & Maintenance of fish stalls Sanitation, cleanliness and efficient running.	Sincerity Salesmanship

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1.	2.	3.	4.	5.
.7.	GEAR TECHNICIAN			
.7.1	Surveying and requirement of gear and tackle	Procedures for different types of surveys and different types of fishing nets, boats and accessories. Gear use and their efficiency.	Inspection and recording of the nets and boats in use. Present and future requirement including renovation and improvements.	Observation Keenness
.7.2	Procuring raw materials for nets and tackles	Different types of raw material market survey- price structure supply and demand.	Visit to market	Good conduct
.7.3	Net making and mending	Principles of preparation and framing different type of nets. Mending materials and technique types of nets.	Weaving of webbing, Framing of nets and traps Mending with various agents	Skillfulness
.7.4	Demonstration and use of different gears and tackle (different type of crafts)	types of nets and their use	Operation of various nets.	Skillfulness

1.	2.	3.	4.	5.
7.5	Preservation of nets and tackle	Different methods and techniques of preservation for cotton and synthetic nets and maintenance of boats.	Treatment of the nets with different indegenous materials and chemicals. Proper handling drying and storing.	Hardwork. Carefulness
8.	EXTENSION ASSISTANT			
8.1	Maintenance of liason with fisheries department, research, education, industry, fisherman and fish farmer.	Introduction to fish and fisheries in India alongwith various departmental and institutional set ups includingfisheries legislation and conserevation.	Visit to department, institutes, banks, and industry.	Observation Good Condust.
8.2	Organising transfer cf technology trhough different media	Principles, concept and objectives of extension for dissemination and popularization of all fishery projects and programmes by use of various mass media and audio-visuals.	Procurement of materials of dissemination Handling, operation and maintanance of necessary audio-visual aids	Skillfulness Broadminded Alertness Cooperative Leadership

1.	2.	3.	4.	5.
3.8.3	Feed back problems and constraints.	Acquaintance procedures for Understanding for information supplied, persons, motivated, difficulties encountered and problems faced and fresh requirement.	Close contact with fishermen, farmers, and industries collection of success stories alongwith diffeculties and constraints encountered	Observation Alertness Comprehension
3.8.4	Evaluation of transfer of technologies as applicable to local arreas.	Procedures and Methodology for individual group and mass contact, specific knowledge for the technologies disseminated, viz-a-vis Response, persons motivated and benefitted/failures and non-motivation	Arranging and organising discussions, group meetings press, radio and T.V. Comments/fisherman, farmer and public reaction for total evaluation of sucess/ failures and analysis for improvements.	Observation Alertness Keeness Comprehension.

1.	2.	3.	4.	5.
3.9	SURVEY ASSISTANT			
3.9.1	Assisting in survey of fresh water fisheries resources of the area.	- Definition &scope of fishery statistics - Guidelines for training good performance - Census & sample survey methods.	- Disigning proforma - Participation in survey. - Collection of data.	Hardwork Comprehension
3.9.2	Assisting in conducting socio-economic Survey of fishermen population	- refer to 3.9.1	- refer to 3.9.1	refer to 3.9.1
3.9.3	Assisting in market Surveys	- refer to 3.9.1	refer to 3.9.1	refer to 3.9.1
3.9.4	Assisting in compilation & analysis of data.	- Compilation and tabulation of data. - Diagrammtic and graphical representation - Mean and standard deviation.	- Tabulation of data - Drawing bar diagram, histogram and frequency curves. - Computation of Mean and standard deviation. - Report writing.	Hardwork Comprehension

1.	2.	3.	4.	5.
3.10	MANAGEMENT ASSISTANT (FISHERIES ESTATE)			
3.10.1	Assistance in establishment of Fishery Estate.	- Principles and objectives of fishery estate.	- Assistance in survey of area	Hardwork Knowledge
3.10.2	Assisting in preparation of survey reports, plans, estimates alongwith feasibility reports of fishery estates.	- Important components like land, water supply, availability of seed.	- Assisting in preparation of reports.	Comprehension
3.10.3	Assisting in the preparation of detail reports.	- Basic knowledge of all the components like inland & brackishwaters, institutional finance and socio-economics of fisherman.	- Exercises in preparing rough layout and draft reports based on technical information.	Comprehension Hardwork.
3.10.4	Arranging of infrastructure.	- Organising hypophysation, hatchery set up, nursery and pond management, stock taking and marketing.	- Working at farms for induced breeding, rearing and disposal of stock	Comprehension Observation Skillfulness
3.10.5	Procurement of stocking materials.	- Market survey for availability of stocking materials and their price structure and transport.	- Handling, harvesting, Packing and transport of stocking materials	Skillfulness Carefulness

1.	2.	3.	4.	5.
3.10.6	Assistance in executing the programme.	- Details of availability of fishery estates and the organisation, controlling departments and beneficiaries. - Procedures and formalities - Initiate, organise and assist the technical programme.	- Propagation of the project amongst fisherman and enterprenurs - Field demonstration	Refer to 3.10.3
3.10.7	Maintanance of records and accounts.	- refer to 3.5.8	- refer to 3.5.8	- refer to 3.5.8
3 11	SELF EMPLOYMENT RUNNING OF FISH FARM FOR CULTURE:			
3.11.1	Seeking guidance.	- seek consultancy from state fisheries Departments and dealing fisheries institutes.	- Visit to concern institutions.	- Technical integrity

1.	2.	3.	4.	5.
3.11.2	Selection of site/pond, arranging site on long lease.	- Criteria of site selection. - Leasing policies.	-	-
3.11.3	Preparation of the project.	- [illegible] water supply, availability of seed materials, [illegible] material, production and marketing.	- Preparation of project report.	- Comprehension - Entrepreneurship
3.11.4	Arranging the institutional finance.	- Various agencies which are financing such fish culture projects and fishermen and their function. - State schemes - Schemes sponsored by IBRD	- Visit to some of the agencies and acquainting with their work - Filling of application for loan and insurance.	- Initiative - Timeliness
3.11.5	Creating the infrastructure.	- Study of model schemes-Construction of pond, availability of seed, feed, measures and fertilizers.	- Preparation of model schemes for 1 or 2 Ha fish farm for cultural purpose:	- Comprehension
3.11.6	Performing all duties of field assistant.	-refer to 2.1	- refer to 2.1	- refer to 2.1

1.	2.	3.	4.	5.
3.11.7	Harvesting and marketing	- Methods of harvesting, conditioning exygen packing.	- Harvesting of seed from nurseries, segregation, conditioning & counting.	skillfulness
		- Transhipment of oxygen packed seed and in canvass hapa.	- oxygen packing, calculation of number size wise.	Carefulness
3.11.8	Maintenance of records and accounts.	- refer to 3.5.8	- refer to 3.5.8	refer to 3.5.8
3.12	ORNAMENTAL FISH PRODUCTION			
3.12.1	Seek Consultancy.	- refer to 3.11.1	- refer to 3.11.1	refer to 3.11.1
3.12.2	Preparation of the project.	- refer to 3.11.3	- refer to 3.11.1	refer to 3.11.1
3.12.3	Arranging the Irstitutional finance.	- refer to 3.11.4	- refer to 3.11.4	refer to 3.11.4

1.	2.	3.	4.	5.
2.4	Creating the infrastructure	- Construction of cement cisterns, availability of seed, feed, fertilizers and aquarium and other display items.	- contact with aquarium suppliers. - fabrication of model aquarium.	comprehension skillfulness
12.5	Maintenance and breeding	- Biology,breeding,rearing and feeding habits - Common diseases and control	- Breeding and rearing of ornamental fishes - Identification of disease and its prophylaxis	Comprehension Skillfulness.
2.6	Marketing and sales promotion.	- Assessment of the demand - Ways and means of Displaying and Advertisement	- Visiting advertising agencies and acquainting with their working	Foresightedness Ability to organise. Enterpenerurshi
2.7	Maintnance of records and accounts.	- refer to 3.5.8	- refer to 3.5.8	-refer to 3.5.8

1.	2.	3.	4.	5.
.13	SPAWN PRODUCTION			
.13.1	Seeking guidanance	- refer to 3.11.1	- refer to 3.11.1	- refer to 3.11.1
3.13.2	Selection of site/ pond, arranging site on long lease.	- refer to 3.11.2	- refer to 3.11.2	-refer to 3.11.2
3.13.3	Preparation of the project.	- refer to 3.11.3	- refer to 3.11.3	-refer to 3.11.3
3.13.4	Arranging the institutional finance.	- refer to 3.11.4	- refer to 3.11.4	-refer to 3.11.4

1.	2.	3.	4.	5.
3.13.5	Creating the infrastructure.	- Study of model schemes-construction of pond, installation of hatchery availability of seed, feed, manures and fertilizers.	- preparation of Model Schemes for 1 or 2 Ha fish farm for rearing of spawn - Operation and maintenance of hatchery.	- comprehension - Skillfulness
3.13.6	Performing all duties of field assistant.	- refer to 2.1	- refer to 2.1	- refer to 2.1
3.13.7	Harvesting anl marketing	- refer to 3.11.7	- refer to 4.11.7	- refer to 3.11.7
3.13.8	Maintenance of records and accounts.	- refer to 3.5.8	- refer to 3.5.8	- refer to 3.5.8

1.	2.	3.	4.	5.
3.14.	PITURITARY BANKS			
3.14.1	Seeking guidance	- refer to 3.11.1	-refer to 3.11.1	- refer to 3.1
3.14.2	Survey of potential sources for pituitary gland	- sources for obtaining pituitary gland.	- visit to fish landing centre and fish market	- Observation - Hardwork - Comprehensio
3.14.3	Preparation of the Project	- refer to 3.11.3	- refer to 3.11.3	- refer to 3.1
3.14.4	Arranging the institutional finance.	- refer to 3.11.4	- refer to 3.11.4	- refer to 3.1
3.14.5	Procurement of pituitary gland and its preservation	- Techniques of Pituitary gland removal and preservation	- Visit to fish market - Removal and preservation of pituitary gland.	- Skillfulness
3.14.6	Sale of glands	- Location fish bree-durig farms and thrir requirement.	- Visit to fish breeding farms for sale orders.	- Hardwork - Salesmanship
3.14.7	Maintenance of records and accounts.	- refer to 3.5.8	- refer to 3.5.8	- re fer to 3.

1.	2.	3.	4.	5.
3.15 **FEED MANUFACTURE**				
3.15.1 Seeking guidance	-refer to 3.11.1	- refer to 3.11.1		-refer to 3.11.1
3.15.2 Survey of market	-Assessment of feed demand	- visit to market		- Comprehension
3.15.3 Preparation of the project.	-refer to 3.11.3	- refer to 3.11.3		- refer to 3.11.3
3.15.4 Arranging the institutional finance	-refer to 3.11.4	- refer to 3.11.4		-refer to 3.11.4
3.15.5 Creating the infrastructure	-Feed marking & Pelletizing equipment. - Types of store.	-		-
3.15.6 Preparation of feed	- Types of feed - Feed ingredients - Binding agents - Coversion into suitable forms.	- Feed making		- Comprehension
3.15.7 Marketing and sales promotion.	- refer to 3.12.6	- refer to 3.12.6		- refer to 3.12.6
3.15.8 Maintanance of records and accounts.	- refer to 3.5.8	- refer to 3.5.8		- refer to 35 .8.

1	2	3	4	5
3.16	FISH MARKETING			
3.16.1	Seeking guidance	- refer to 3.11.1	- refer to 3.11.1	- refer to 3.11.1
3.16.2	Survey of market	- consumer perference in the area, seasonal demand and price variation.	- visit to fish market and ascertaining the demand of fish, season and pricevise.	- Hardwork - Observation
3.16.3	Preparation of project.	- refer to 3.11.3	- refer to 3.11.3	- refer to 3.11.3
3.16.4	Arranging the institutional finance.	- refer to 3.11.4	- refer to 3.11.4	- refer to 3.11.4
3.16.5	Creating the infrastructure	- types of storage, place and packing item.	- visit to fish landing centres and fish market.	- Observation.
3.16.6	Procurement of stock & its preservation.	- methods of fish handling and preservation.	- handling and packing of fish.	-Skillfulness -Hardwork.
3.16.7	Marketing.	- methods of marketing - places of marketing.	- disposal of stock	- Hardwork - Observation.
3.16.8	Maintenance of records & accounts.	- refer to 3.5.8	- refer to 3.5.8	- refer to 3.5.8

1	2	3	4	5
3.17	NET MAKING/GEAR OPERATOR			
3.17.1	Seeking guidance.	- refer to 3.11.1	- refer to 3.11.1	- refer to 3.11.1
3.17.2	Survey of market.	- types of net - availability of raw materials and price structure.	- visit to market	- Comprehension.
3.17.3	Preparation of the Project.	- refer to 3.11.3	- refer to 3.11.3	- refer to 3.11.3
3.17.4	Arranging institutional finance.	- refer to 3.11.4	- refer to 3.11.4	- refer to 3.11.4
3.17.5	Procurement of raw materials.	- kinds of net weaving materials, floats and sinkers. - raw material supplying agencies.	- visit to market for procuring net making materials.	- Comprehension.
3.17.6	Marketing and sales promotion.	- refer to 3.12.6	- refer to 3.12.6	- refer to 3.12.6
3.17.7	Maintenance of records and accounts.	- refer to 3.5.8	- refer to 3.5.8	- refer to 3.5.8

1	2	3	4	5
3.18	SEED COLLECTION AND BUNDH BREEDING			
3.18.1	Seek consultancy.	- refer to 3.11.1	- refer to 3.11.1	- refer to 3.11.1
3.18.2	Survey of potential resources.	- Location of breeding sites in rivers and bundhs.	- Visit to breeding sites.	- Comprehension.
3.18.3	Preparation of the project.	- refer to 3.11.3	- refer to 3.11.3	- refer to 3.11.3
3.18.4	Arranging institutional finance.	- refer to 3.11.4	- refer to 3.11.4	- refer to 3.11.4
3.18.5	Creating the infrastructure.	- Necessary equipments like plastic pool, hundies, shooting net, and their operation.	----	----
3.18.6	Collection of spawn	- Methods of seed collection. - Handling and methods of segregation of seed into desirable and undesirable and sizewise.	- Operation of spawn collection net/seed collection net. - Collection of seed from rivers and bundhs.	- Comprehension - Skillfulness.

3.18.7	Marketing of seed.	- Conditioning, packing and transport.	- Demonstration on handling, conditioning, segregation, packing and transport.	---
3.18.8	Maintenance of records and accounts.	- refer to 3.5.8	- refer to 3.5.8	- refer to 3.5.8

vrs.

4. OBJECTIVES OF THE VOCATIONAL COURSE

- To impart knowledge about basic inland fisheries practices for increasing fish production and providing job opportunities.
- To train man power for inland fisheries development.
- To impart knowledge for developing proficiency and sound management practices in :
  a) Maintaining brood stock.
  b) Fish seed production.
  c) Rearing fish seed upto fingerling stage.
  d) Packing and transportation.
  e) Production of feed.
  f) Maintaining farm for fish production.
- To train personnel in natural seed collection and bundh breeding.
- To train personnel for improving reservoir fisheries.
- To train personnel in hypophysation technique.
- To develop young entrepreneurs for self employment through different farming schemes.
- To develop organisational capabilities in fisheries and fisheries workers for assisting cooperatives and other fishermen societies.
- To develop facilities for production/collection and sale of fish feed, manures, pituitary glands, nets, ornamental fish and other fishery requisite.
- To develop fishery workers as a link between fisheries supporting organisation institutions and the farming community.
- To develop competence for assisting scientific investigations and laboratory assistance.

- To develop competence for resource utilisation through fisheries estates.
- To train individuals in need based fishery operatives like surveying, organisation of Meen Mahotsava (Melas) etc.
- To prepare fishery workers as a capable organisor/supervisor/assistant for fishery oriented activities in un-organised rural and organised urban sector.

5. MARKING SCHEME

Sl.No.	Paper	Subject	Theory		Practicals		Total	
Standard XI			Marks	Periods	Marks	Periods	Marks	Periods
1)	I	Inland Fisheries (General)	100	120	100	180	200	300
2)	II	Fish Breeding and spawn production	100	120	100	180*	200	300
3)	III	Nursery pond Management	100	120	100	180*	200	300
			300	360	300	540	600	900
Standard XII								
4)	-	On-the-job training	-	-	-	300**	-	300
5)	IV	Aquaculture	100	120	100	180*	200	300
6)	V	Riverine and Reservoir Fisheries.	100	120	100	180*	200	300
7)	VI	Fisheries Management & extension.	100	120	100	180*	200	300
			300	360	300	840	600	1200

Standard XI			
	Total Papers -3	Total Marks	600
	(Theory and Practicals)	Periods	900
Standard XII			
	Total papers - 3	Total Marks	600
	(Theory, practicals and on-the-job training)	Periods	1200

* This includes practicals at the laboratory and the field work to be done at the fish seed farms, tanks and reservoirs, fish market, cooperative societies and other institutions.

** The teacher should take the students for on-the-job training for 2-3 months to fish seed farms, tanks and reservoirs, fish markets co-operative societies. For this purpose he should make necessary arrangements at least four months in advance so that students can be put to actual work situations. Visits to fish seed farms for study of various activities in connection with the breeding of fish should be arranged in the months of July and August.

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*GSF

SYLLABUS

Inland Fisheries (General)

Theory - I

Max. Marks : 100
Periods : 120

- Introduction to fisheries.
- Present status of inland fisheries in India.
- Types of fisheries - fresh water, marine and brackish water; capture and culture fisheries.
- A general account of the freshwater, brackishwater fin and shell fish of India with special reference to Indian Major carps, exotic fishes, air-breathing fishes, chanos, mullets and prawns.
- Distinguishing characters, food and feeding habits, reproduction and economic importance of above fishes.
- Common fish diseases and their control.
- Common inland fishing gears and their operation.
- Aquatic pollution in relation to fisheries and its prevention.
- Common aquatic weeds - general classification and control measures.

PRACTICALS - I

Max. Marks : 100

Periods : 180

- General morphometry of a typical fish and prawn.
- Identification of common fishes and prawns (30 species)
- Identification of common aquatic weeds - control measures.
- Identification of common fish parasites and diseases and their control measures by application of lime, salt bath, $KMNo_4$ bath, acriflavin, malachite green and other antibiotics.
- Fabrication and operation of various gears and tackle.
- Preparation of biology records and herbarium

Fish Breeding and spawn production

Theory - II

Max. Marks: 100
Periods : 120

Natural and artificial spawning of carps in India.

Natural spawning of carps in rivers and reservoirs spawning season - factors influencing spawning - spawning grounds - location, survey, mapping - spawn collection grounds - location, quality of water, water current, Indicator organisms, phase of moon, weather, temperature etc. Techniques of reverine spawn collection. Spawning of carps in bundhs - Wet bundhs and dry bundhs.

Breeding in wet bundhs - location, topography, catchment area, rainfall, index mapping, spawning grounds. Breeding in dry bundh - site selection, construction and design of dry bundhs - topography, rainfall, water current, nature of soil, sex ratio and density.

Breeding by hypophysation - Maintenance and care of brood fish stock - identification of male and female - age and size at maturity - maturity stages - fecundity - selection of brooder - sex ratio - location, collection and preservation of pituitary gland - basis hormones of pituitary gland and their role - determination of hormone doese per unit weight of spawner, preparation and administration of hormone - number and interval between doses - spawning success percentage.

Breeding of common carp - types of egg collectors - weeds kakabans, synthetic and natural fibres, methods of their use.

Reproductive biology of ornamental fish and breeding.

Selective breeding and hybridisation, stripping - dry and wet methods.

Different embryonic developmental stages of major carps.

Hatching environment - pits, ponds, cisterns, canals hapas and other hatchery systems - glass jars - tin - Plastic buckets - chinese hatchery, L.D.P.E.D. - 80 and D-81 their merits and demerits.

- Spawn collection methods of spawn measurement, conditioning packing and transport of spawn by various methods.

PRACTICALS- II

Max. Marks : 100
Periods : 120

- Survey of natural breeding grounds and spawn collection centre.
- Operation of different spawn collection nets.
- Identification of desirable and undesirable spawn.
- Spawn conditioning, packing and transport.
- Identification of male and female brooder - selection of good spawner - fecundity study.
- Pituitory gland removal and preservation - calculation of doses - preparation of hormone solution - administration of hormones - pairing of brooders - breeding operations.
- Collection of eggs - identification of fertilized and un-fertilized eggs - calculation - fertilization.
- Hatching of eggs in various hatchery systems and observation - hatchery operation - calculation of hatching percentage - counting, packing and transport.
- Practical demonstration on hybridization and stripping.
- Preservation gonads and different embryonic developmental stages of carps.
- Breeding of common carps and ornamental fishes.
- Preparation of field and biology records.
- Field visits to various farms and hatchery sites.

Nursery pond Management

Theory - III Max. Marks: 100
Periods : 120

- Types of nursery andrearing ponds.
- Design and construction of ideal nursery and rearing ponds.
- Nursery and rearing pond management - pre and post stocking management.
- Pre-stocking management - drying - removal of weeds and unwanted organism - eradication of unwanted fishes - predator and minnows, poisoning technique - trimming of bundhs - watering - liming - fertilization and manuring - types of manures used - their doese - single and phased manuring - study of physico-chemical parameters of water - assessment of fish food organism - identification of planktons - methods of insect removal by netting and different types of emulsions - determination of doses and its applications.
- Post stocking management - determination of stocking density of spawn - intensive stocking - artificial and supplementary feeds and feeding - feeding frequency - analysis of feed particles size - period of rearing and growth rates - manipulation of stock and feeding, thinning, sample netting - periodic determination of health and care.
- Harvesting - size and time - determination of survival percentage, conditioning, packing and transport.
- Distinguishing characters of fry and fingerling of Indian major carps, exotic fishes, air breathing fishes chanos, mullets and culturable prawn juveniles.

PRACTICALS - III

Max. Marks : 100
Periods : 180

- Identification of fry and fingerling of Indian major carps, exotic fishes, air-breathing fishes, chanos, mullets and prawn juveniles.
- Identification of common predatory and weed fishes.
- Identification of common fish food organism.
- Collection of samples, preservation and quantitative estimation.
- Identification and control of harmful aquatic insects, by netting and applying oil emulsions.
- Eradication of weeds and predators from nursery ponds.
- Water analysis for determining pH dissolved, oxygen, free carbon dioxide and total alkalinity - regular observation on turbidity and temperature.
- Calculation of doses for manures and fertilizers and their application.
- Handling and stocking of spawn - periodic sample netting and observation on growth and health.
- Calculation of doses for supplementary feeds and their application.
- Seed harvesting - packing and transport.
- Preparation of biology record.

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Standard XII

Max. Marks: 100
Periods: 120

THEORY - IV

AQUACULTURE

- Types of fish farms - fresh water - brackishwater and Cold water.
- Study of cross section a typical pond.
- Types of ponds - nursery, rearing, stocking, seasonal and perennial
- Disigning, construction and maintenance of ponds.
- Productivity of ponds and food chairs, study of Primary and Secondary productivity.
- Village tanks and their imporvement for fish culture.
- Principles of fish selection.
- Principles of mono and polyculture including composite culture - Intensive and extensive fish culture-Integrated fish farming - species composition, size at stocking;
- Techniques of cat-fish and air-breathing fish culture;
- Culture in running waters, cage culture, frog culture and shell fish culture.
- Basic knowledge of cold water fisheries, biology, breeding and culture of Trout & Mahaseer.
- Principles of brackish water fish culture-Important cultivable brackish water fishes and prawn, their food and feeding habits, seed resources, seed collection and cultural practices.
- Rearing of Ornomental fishes - upkeep and maintenance of aquarium.

PRACTICALS - IV

Max. Marks : 100
Periods: 180

- Drawing cross section of a typical ponds.
- Visit to fish farms, tanks their survey and management.
- Cultural practices - trial netting - stock manipulation recording of data etc.
- Fabrication of Cages and their management.

- Callection of brackish water fish and prawn seed by various devices.
- Maintanance of sluice gates in brackish water farming.
- Culture of live fish food.
- Fabrication of aquarium.
- Use of soil testing kit.
- Methods of feeding and feed mixtures.

Max Marks: 100

Periods: 120

THEORY - V

REVERINE AND RESERVOIR FISHERIES.

- General characterstics of lotic and lentic waters.
- Major river systems of India and their important fisheries.
- Types of reserviors, dams and weirs.
- Pre-impoundment survey, river ecology, fish and biota, fishing villages and fishermen population, topography of purposed submerged areas, fish breeding gounds.
- Post impoundment survey, water level and areas, inflows and out flows, index mapping, ecological changes with time-water, biota and soil physico-chemical parameters and assessment of matural food.
- Stocking of reservior - by natural spawning - by seed cultivated in ponds - fish stock improvement, suitable fish species, their number, size and areas for stocking.
- Techniques for growth age determination by scale and tagging, kinds of tags, methods of tagging.
- Methods of exploitation of reservoir fishery - by seining, gill netting, trammel netting long lining cast netting etc.
- Elementary principles of running and maintenance of out-board and inboard engines of fishing boats-principles of echo sounding.
- Reservior management - Fishing regulation, closed season, mesh size regulation, removal of unwanted fishes, conservation of fisheries.
- Intensive fish culture in floating and marginal enclosures cage culture, pan culture.

PRACTICALS - V

Max. Marks: 100

Periods: 180

- Survey of spawning and seed collection grounds.
- Visit to dam site- studies of weirs and spillways.
- Post impoundment survey - rêcording water level- physico-chemical parameters of water - collection of bottom soil for analysis of benthos - operation of water samplers and ekman's dredge - assessment of natural food.
- Fingerling stocking in reservior - tagging operation-growth and length weight relationship.
- Fishing operations - analysis of catch.
- Collection of scales - determination of age.

Max. Marks : 100

THEORY-IV Periods : 120

FISHERIES MANAGEMENTS AND EXTENSION

- Definition and scope of Fishery statistics, collection of data - census and sampling enumeration, use of questionnair proforma in collection of data, compilation, tabulation, graphical and diagramatic representation, preliminary analysis and intrupretation of data, report writing.

- Definition of wants, demand, supply, price, value, utility. market demand and elasticity of demand. Factors responsible for fish production. Enterpreneurship. Role of fisheries in national economy. Economics of different types of fish culture systems. Fisheries legislation. General principles of accountancy. Single and double entry system. Maintenance of registersand records, preparation of balance sheet.

- Principles of fish marketing, marketing functions - services, transport; Agencies - Wholesalers, retailers, channels, Marketing margins - producers share. Organised marketing, market survey, storages - types and their merits and demerits. Price formulations.

- Financial agencies involved in fisheries development projects and their terms and conditions for loan.

- Aims and objections of cocoperative meovement. General cooperative principles, Organisation of fishery cooperative societies. Problems of fishery cooperative society. Cooperative marketing - its adventages and problems.

- Aims and objectives of extension, techniques of extension. organisation of fisheries extension programmes and Meen Mahotsava (Mela)

- Basic concept of fishery estate - design, planning, Construction and maintenance. Brackishwater and fresh water fishery estates.

PRACTICALS- IV

Max Marks : 100

Periods: 180

- Collection of data, compliation, tabulation and presentation. using charts diagrams and other display materials.

- Analysis and interprecation of data and preparation of report.

- Visits to cooperative societies.

- Visits to fish markets - Wholesale & retail.

- Organising/participating in exhibition for extension.

- Visit to financial institutes.

- Filling up of application forms.

SUGGESTED LIST OF LABORATORY CHEMICALS: FERTILIZERS DETERGENTS,PESTICIDES: PITUITARY GLANDS.

S.No:	Name of Chemical	Quantity
1.	PH strips assorted	24
2.	Filter papers (Ordinary)	4 Packets.
3.	Phenol red	250 ml.
4.	Thymol blue	25 ml
5.	Methyl orange	250 ml.
6.	Manganous sylphate-monohydrous	2 Kg.
7.	Potassium Iodide	500 Kg.
8.	Potassium Hydoxide (Pellets)	1 Liters
9.	Starch powder	100 gm.
10.	Sulphuric acid (L.R.grade)	4 Liters.
11.	Sodium thiosulphate	2 Kg.
12.	Phenolphthalein	100 gr.
13.	Sodium hydroxide (pellets)	500 gm.
14.	Potassium chromate	500 gm.
15.	Borax	100 gm.
16.	Formaldehyde solution.	100 Liters.
17.	2-4-D	10 "
18.	Sodium Chloride	1 Kg.
19.	Potassium Permanganate.	500 Gm.
20.	Methyl blue	500 ml.
21.	Acriflavin	500 ml.
22.	Copper Sulphate	500 gm.
23.	Simazine	10 Kg.
24.	Malachite green	250 gm.
25.	Raw cow dung	as required
26.	Poultry manure	as required
27.	Lime	100 Kg.
28.	Super Phoshate (single)	100 Kg.
29.	Urea	50 Kg.
30	Ammonium Sulphate	50 Kg.
31.	Groundnut oil cake/mustard oil cake	200 Kg.
32.	Rice bran/rice polish	50 Kg
33.	Mahua oil cake	100 Kg.
34.	Cabalt chloride.	100 Kg.
35.	Pelleted feed.	100 Kg.

36.	Chloromycetine capsules	100
37.	Mustard oil	16 Liters.
38.	Hyoxide - 1011	1 Litres.
39.	Teepol - B - 300	2 Litres.
40.	Vim.	10 Kg.
41.	Pituitary gland	2000 mg.
42.	Cotton.	6 Lbs.
43.	Distilled water.	100 Litres.
44.	Distilled water ampoules.	100
45.	Aquarium cement (Bitumin)	20 Kg.
46.	Ethyl alcohol	1 Litre.
47.	Tannic acid	1 Litre.

SUGGESTED LIST OF EQUIPMENT AND TOOLS

Sl.No.	Name of article	Quantity
1.	Centrifuge machine hand operated	2
2.	Water sampler	2
3.	Ekman's dredge	1
4.	Dissection sets	12
5.	Tongs	4
6.	Needles	
7.	Cathetor	12
8.	Bone cutter	4
9.	Hack saw	4
10.	Butcher's knife	4
11.	Cast net	2
12.	Fry collection net	2
13.	Model drag net	1
14.	Model gill net	1
15.	Hook and line	4
16.	Models of fish traps (various types)	1 each
17.	Refrigerator	1
18.	Field microscope	2
19.	Compound microscope	1
20.	Secchi disc	2
21.	Thermometer	6
22.	Aerator	12
23.	Aquarium heater	12
24.	Aquarium thermometers (0°-40°C)	12
25.	Aquarium thermostat	12
26.	Spades	6
27.	Khurpi	12
28.	Sprayer	1
29.	Air compressor 1 H.P.	1
30.	Water pump 1 H.P.	2
31.	Plastic pool 6' dia x 1 m	2
	Plastic pool 4' dia x 1 m	2

32.	Chemical balance		1
33.	Pan balance		1
34.	Spring balance	1 kg.	2
	"	2 "	2
	"	5 "	1
	"	20 "	1
35.	Breeding hapa 2m x 1m x 1m	24 mesh garfil cloth	6
36.	Hatching hapa (set 0.9m x 0.9m x 0.5m	16 mesh garfil cloth	6
37.	Weight box for chemical balance		2
38.	Enamel trays	2'x1'	6
39.	Enamel basin		4
40.	Mug	1 litre	6
41.	Bucket		6
42.	Torch light		4
43.	Pastle and mortar		1
44.	Distillation plant		1
45.	Trolley		1
46.	Hot plate		1
47.	Slide projector with stand and screen		1
48.	Public address system		1
49.	Soil seive		1
50.	Oxygen cylinder	13.5 kg.	1
51.	Seed packing tins		4
52.	Polythene bags for seed packing		50
53.	Spawn measuring cups 2ml, 5ml, 25ml, 50ml.		2 sets
54.	Tape recorder		1
55.	Tagging equipment		2
56.	Tub		2
57.	Aquarium		6
58.	Aquarium nets		12
59.	Net weaving needles (iron)		25
60.	Lovibond pH comparator with Phenolred and thymol blue filters and disc		1

61.	Aluminium angles	100 feet
62.	Glass cutter (Diamond pencil)	1
63.	Hand drilling machine	2
64.	Iron file	4
65.	Filter for aquarium	2
66.	Soil screw apparatus	4
67.	Hand net	12
68.	Soil testing kits	4
69.	Hatchery jars	3
70.	Spawn receiving tank	1
71.	Round hapa (Nylon) 6'dia x 1 m.	2
72.	Egg basket	3
73.	Over-head tank (2000 litres)	1

SUGGESTED LIST OF GLASSWARES

Sl.No.	Name of article		Quantity
1.	Hypodermic syring	2 ml.	6
2.	" "	5 ml.	2
3.	Tissue homogeniser		8
4.	Watch glass		24
5.	Contrifuge tubes graduated		12
	" ungraduated		12
6.	Petri dish		12
7.	Slides and cover slips		1 pkt. each
8.	Specimen tubes plastic		200
9.	Beakers	25 ml.	6
		50 ml.	6
		100 ml.	12
		250 ml.	12
		500 ml.	4
10.	Conical flask	250 ml.	25
11.	Pipettes	1 ml.	10
		2 ml.	10
		5 ml.	6
		10 ml.	6
12.	Burettes	50 ml.	20
13.	Funnels		12
14.	Measuring cylinders	5 ml.	25
		50 ml.	25
		500 ml.	6
15.	Volumetric flask	100 ml.	6
		250 ml.	6
		1000 ml.	6
16.	Reagent bottles	250 ml.	100
		500 ml.	12
17.	Sample bottles	250 ml.	100

18.	Wash bottles	500 ml. cap.	24
19.	Glass rod		25
20.	Indicator bottles	(30 ml.)	100
21.	Glass tubing		10
22.	Test tubes	15 ml.	100
23.	Droppers		25
24.	Specimen jars	(assorted)	100
25.	Aquarium glass		
26.	Syring needle	(assorted)	24

10 SUGGESTED LIST OF MISCELLANEOUS ITEMS

S.N	me of article	Quantity
1.	Kerosine	16 litres.
2.	High sped Diesel	16 litres.
3.	Muslin cloth	10 metres.
4.	Ropes (Nylon)	1 roll
5.	Bottle Caps.	100
6.	Burette stand	12
7.	Test tube stand	6
8.	Jerry can 20 lit cap	2
9.	Rubber tubing 1/8"	6 rolls
10.	Rubber tubing 1/2"	2 rolls
11.	P.V.C. pipe 1" flexible	100 ft.
12.	P.V.C. regid pipe 1"	6 m.
13.	P.V.C. regid pipe 1/2"	6 m.
14.	Measuring tape	1
15.	Tags.	1000
16.	Pipe valves 1"	4
17.	Pipe valves 1/2"	6
18.	Sketch pen (set)	6
19.	Marker Pen (set)	6
20.	Stencil set.	4
21.	Stove	2
22.	Petromax	2
23.	Bulbs 100 Watt.	25
24.	Blub holders.	12
25.	Electric wire, plug etc.	as required.
26.	Teplon tape	6 rolls
27.	P.V.C. solution.	1 Litre.
28.	Araldite adhesive.	1 Packet (big)

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41. Hypophysation of Indian Major Caprs by S.L.Chondar.
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43. Manual of sampling and statistical methods for Fisheries Biology, Part-I - Sampling methods J.A. Gulland (1966) FAO mannual in Fisheries Science, No.3, 87 pp.
44. Cooperation a workers educational manual, International Labour Office.
45. Economics - Std.XI, Maharashtra State Board Secondary & Higher Secondary Education, Pune.
46. Management of Artificial lakes and ponds by Bennet.
47. Fishes - India, the land and the people, National Book Trust New Delhi, by M.Chandy, 1970.
48. Biological Monitoring of Inland Fisheries by J.S. Albaster, published by applied science publishers 1977.
49. Pond Fisheries by F.G.Martyshev, published by Amerind Publishing Co.Pvt.Ltd., New Delhi, 1973.
50. Ecology of Inland Waters and Estuaries by Reid G.K. & Wood, published by D.Van Nostrand Co. New York, 1976.
51. Ecology by Odem.
52. Man made lakes by Macdonold.
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Name of the party who are suppling the equipment.

1. M/s. Elico Private Ltd.
230, Hind Rajasthan Dept.Centre,
95, Dadasahed Phalke Road, Dadar, Bombay-14.

2. M/s. K.Lal Bhakir
3E/14, Jhndewalan Extesion, New Delhi.

3. M/s. Adiar Dutta & Co.(Idna) Pvt.Ltd.,
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8th Floor, Harilela House,
36, Mint Road, Bombay-1.

5. M/s. C.Z.Instrument India Pvt.Ltd.,
Court Chambers, 35, Sir Vithaladas Thackery Marg,
Bombay-20.

6. M/s. Metzer India Optical Instrument & Co.,
110, Himalaya House, Palton Road,
Fort, Bombay-1.

7. M/s. Lawrence & Mayo Pvt.Ltd.,
274, Dr. D.N.Road, Fort, Bombay-1.

8. M/s. Toshniwal Bros.Pvt.Ltd.,
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9. M/s. Systronics,
Chandivli Off, Saki Vihar Road, Bombay-72.

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Janshedi, Bunder Lala Nigam Road, Colaba, Bombay-5.

4. M/s. Abbas Solker,
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1. M/s Chemical Corporation, Mangaldas Bldg. No.2,
   Room No.96, 1st Floor, Mangaldas Road, Bombay-2.

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   453-455, Kalbadevi Road, Chikhal House, 1st Floor,
   Room No.43, Bombay-2.

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   38, S.Gandhi Marg, Bombay-2.

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   M.G.Road, Agra-2.

9. M/s. Chemicals & Instruments,
   Sadar Bhatti, Agra.

10. M/s. Biaids, Civil Line, Agra.

11. M/s. Laboratory Apparatus, Raja Niketan,
    Civil Line, Delhi Gate, Agra-2.

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   18, World Trade Centre, Cuff Parade, Colaba,
   Bombay-5.

2. M/s. Plasticage Corporation,
   101, Mittal Estate No.4, Sir M.V.Road,
   Andheri (E), Bombay-69.

3. M/s. Diwan Trader,
   23, Sadashiv Street, 3rd Floor, Bombay-4.

Nylon Nets

1. M/s. Garware Wall Ropes Ltd.,
   Chowpatty Chambers, Sandhurst Bridge,
   Bombay-7.

2. M/s. Sanjay & Ashu Trading Co.,
   Khurja, U.P.